

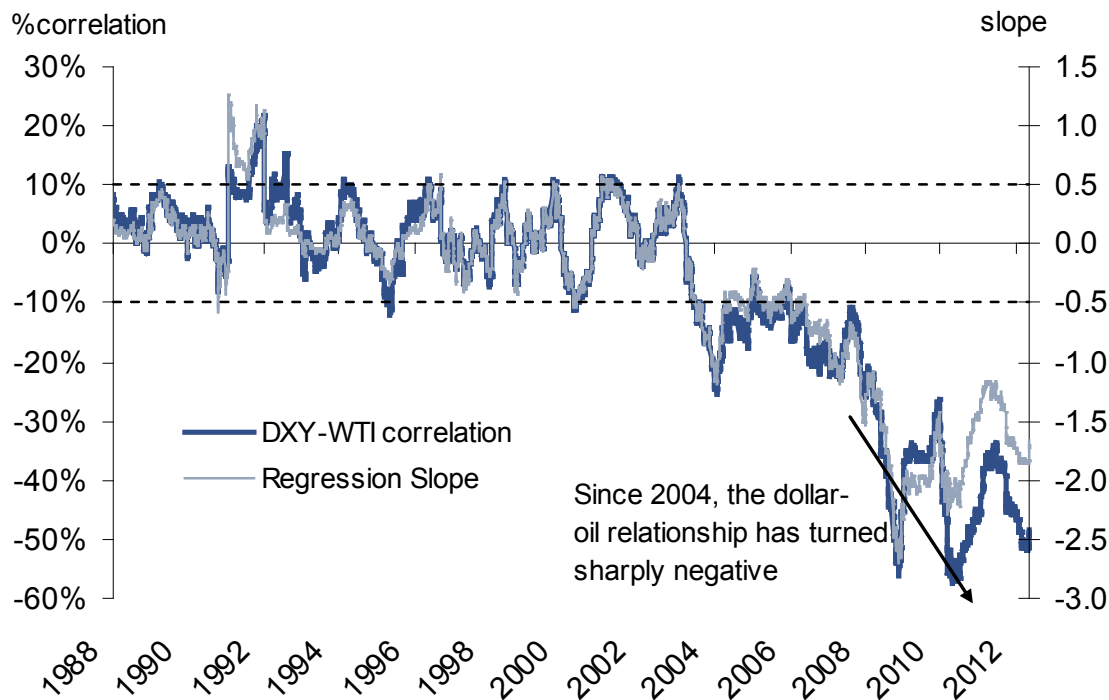
Emerging Oil-Dollar Synchrony and the Financialization of Commodities

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Oil-dollar co-movement has turned negative

High-frequency rolling correlations and regression slopes between daily oil and dollar returns have emerged from the +/-10% range and are now at negative -50% range. We find evidence of a structural break in the statistical relationship before and after 2004

12m rolling correlations of daily WTI and DXY returns



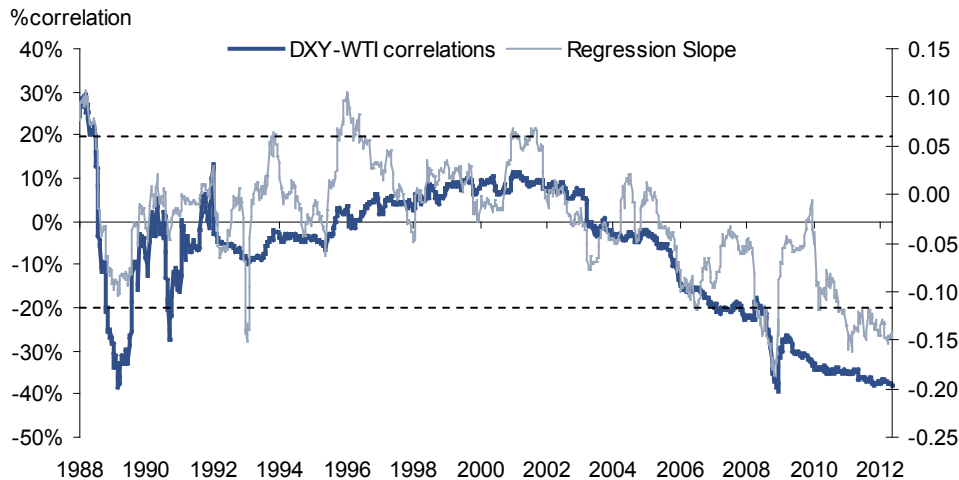
Source: Bloomberg

- Prior to 2004, there seemed to be little systematic relationship between the US dollar and oil prices
- But since 2004, correlations have broken out from the +10%/-10% range and are now at -40%
- However, this simple picture disguises complexities across different frequencies and distributions

but relationship lives in high frequency

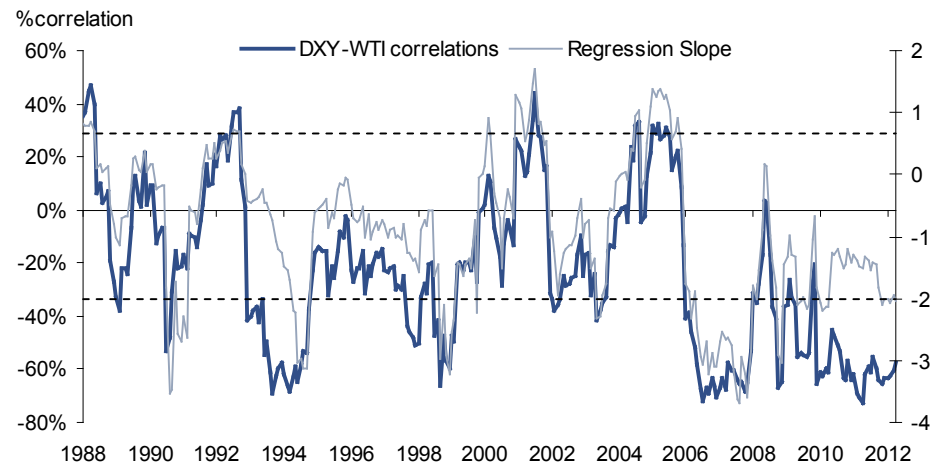
Lowering the frequency to the weekly and monthly level also show a pattern of stronger negative relationship after 2004 but the structural shift is less apparent. Statistical evidence of a structural break is weaker

12m rolling correlations of weekly returns



Source: Bloomberg

12m rolling correlations of monthly returns



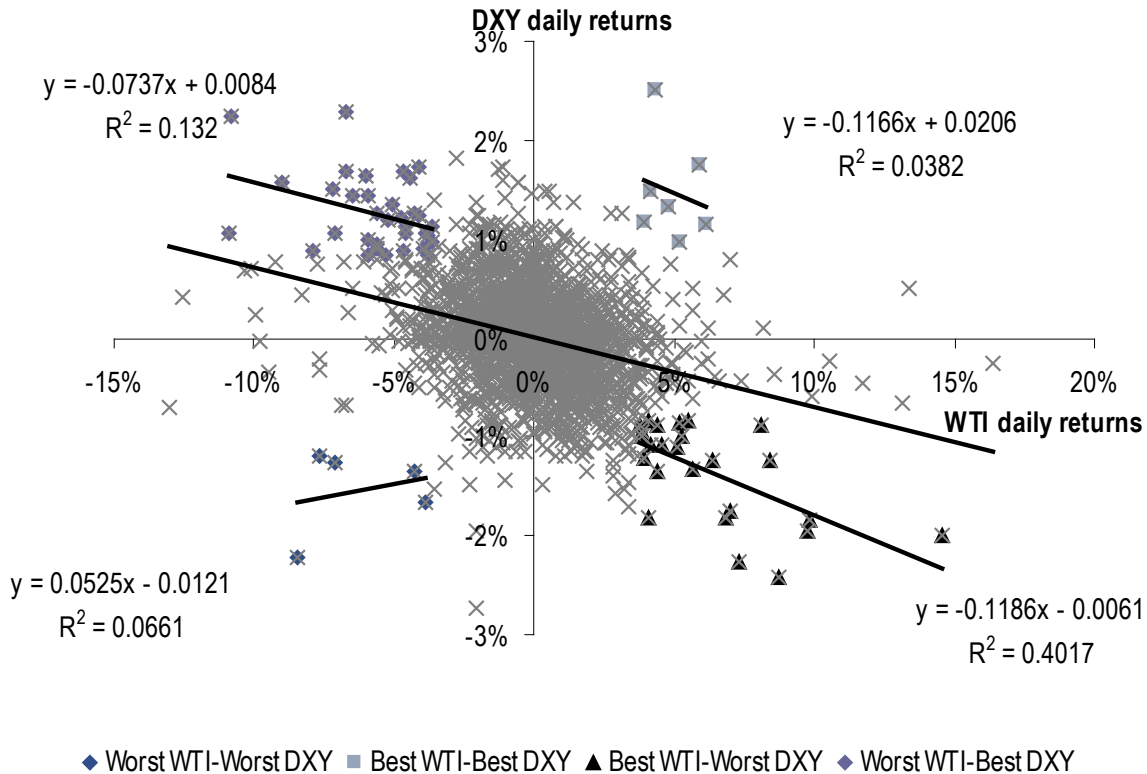
Source: Bloomberg

- Correlations on weekly returns still demonstrate the negative structural shift in the oil-dollar relationship, though the discontinuity is less sharp.
- However, at the monthly frequency and beyond, the effect begins to dissipate and the structural shift is not as apparent. Statistical tests confirm this.

and in the tails of the distributions

Dividing the distribution of returns cross-sectionally, we find evidence to suggest that the strongest relationships between oil and the US dollar may be occurring in the tails of the distribution

Oil-Dollar Correlations in the Distribution Tails



Source: Bloomberg

- The negative relationship also strengthens in the extremes of the distributions
- The negative correlation is driven by the relationship in the upper tail of the dollar return distribution and on both tail ends of the oil return distribution
- This more than offsets a positive relationship when both the dollar and oil fall dramatically

The Play Within The Play

The economic relationship between the US dollar and oil prices flow through multiple mechanisms, often at odds with each other, with causality moving in both directions, and at different time horizons. The table below is only a partial list of potential mechanisms with suggested casual direction, sign, and frequency.

Endogenous Relationships between Oil and the US Dollar

Economic Mechanism	Causal Direction	Sign	Frequency
Denomination Effects	Dollar --> Oil	-	High
Higher US Purchasing Power	Dollar --> Oil	+	Low
Dollar Hedging into Real Assets	Dollar --> Oil	-	Low
Flight-to-Safety/Risk-Off	Hidden Variable	-	High
US Fundamental Demand Signal	Hidden Variable	+	Low
Inflationary Depreciation/PPP	Oil --> Dollar	-	Low
Current Account ToT	Oil --> Dollar	-	High
Medium-of-Exchange	Oil --> Dollar	+	Low
Central Bank Inflation Fighting	Oil --> Dollar	+	High
Petro-Dollar Recycling	Oil --> Dollar	+	Low

Source: IMF

- Multiple economic relationships interconnect the US dollar and oil markets, some suggesting positive relationships and others negative
- Causality flows in both directions or even from an third hidden variable
- The mechanisms also operate at different frequencies
- Only denomination and flight-to-quality mechanisms seem to be consistent with the observed sign, causal direction, and high frequency of the relationship

Granger Causality

Granger Causality Tests between Oil-Gold-Dollar Daily Returns

Pairwise Granger Causality Tests

Sample: 1/02/1987 8/31/2011

Lags: 30 days

Null Hypothesis:	Obs	F-Statistic	Prob.
Oil Returns does not cause Dollar Returns	6404	1.113	30.66%
<u>Dollar Returns does not cause Oil Returns</u>		2.131	0.03%

Pairwise Granger Causality Tests

Sample: 1/02/1987 8/31/2011

Lags: 30

Null Hypothesis:	Obs	F-Statistic	Prob.
Gold Returns does not cause Dollar Returns		1.440	5.69%
<u>Dollar Returns does not cause Gold Returns</u>	6404	1.659	1.34%

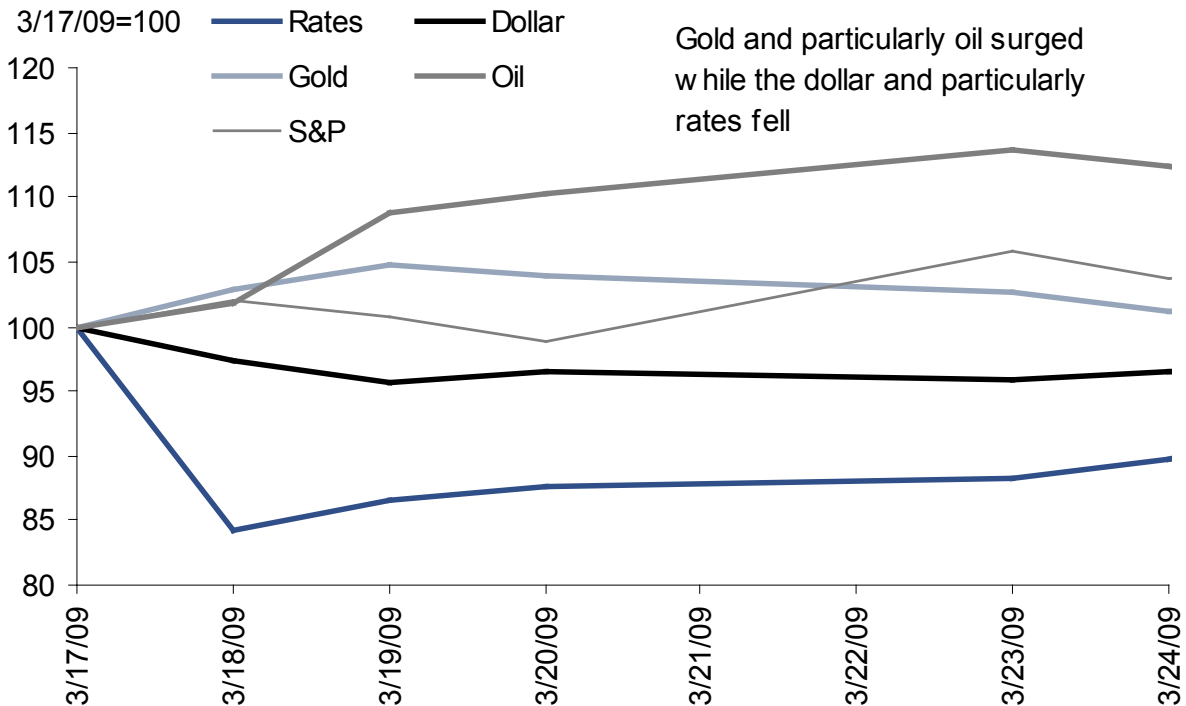
Source: IMF

- Granger causality tests (which cannot capture contemporaneous effects) show statistical support that causality moves from the dollar to oil but not the reverse
- Similarly, we find evidence that the dollar also Granger-causes gold but the statistical significance is not as strong as that for oil

Event Study around Mar-09 QE Announcement

“Macro-significant” events such as the large \$1.2tn escalation of the Fed’s QE program in March 2009 drive the negative tails in the oil-dollar-gold relationship

Asset Prices after 3/17/2009 QE Announcement



Source: Bloomberg

- On March 17, 2009, the US Federal Reserve announced a \$1.2tn escalation of its unconventional balance sheet expansion
- “Macro-financial” asset prices reacted sharply to the announcement
- Nominal gold and in particular oil prices surged
- Meanwhile US Treasury rates (unsurprisingly) and the US dollar and declined sharply

Chow Breakpoint Tests

Chow Breakpoint Tests between Oil-Dollar Regressions

Chow Breakpoint Test: 1/01/2004

Null Hypothesis: No breaks at specified breakpoints

Equation Sample: 1/02/1987 8/31/2011

F-statistic	78.49	Prob. F(2,6430)	0.00%
Log likelihood ratio	155.19	Prob. Chi-Square(2)	0.00%

Chow Breakpoint Test: 2004M01

Null Hypothesis: No breaks at specified breakpoints

Equation Sample: 1987M01 2011M08

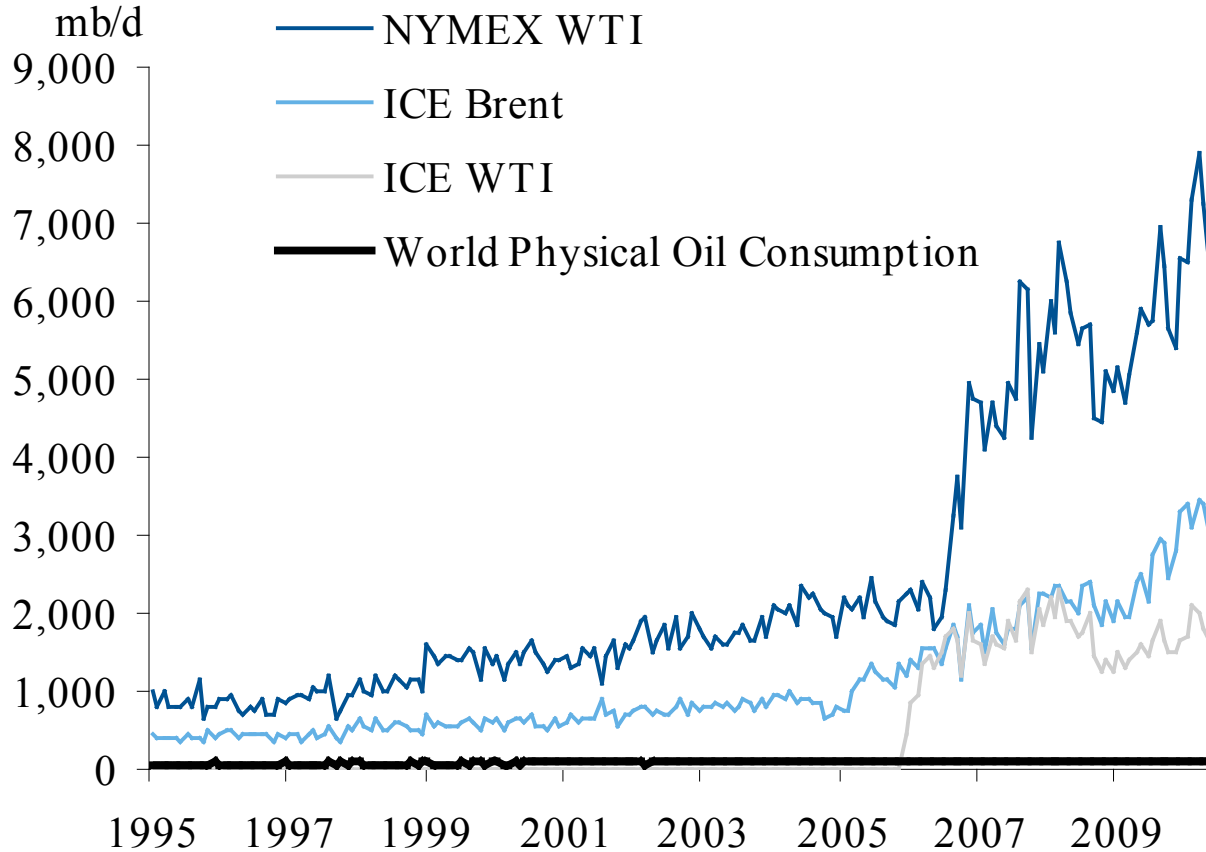
F-statistic	3.73	Prob. F(2,292)	2.52%
Log likelihood ratio	7.46	Prob. Chi-Square(2)	2.39%

Source: IMF

The “Financialization” of Oil Markets

Daily trading volume in paper oil both on futures and swaps now dwarfs physical flows

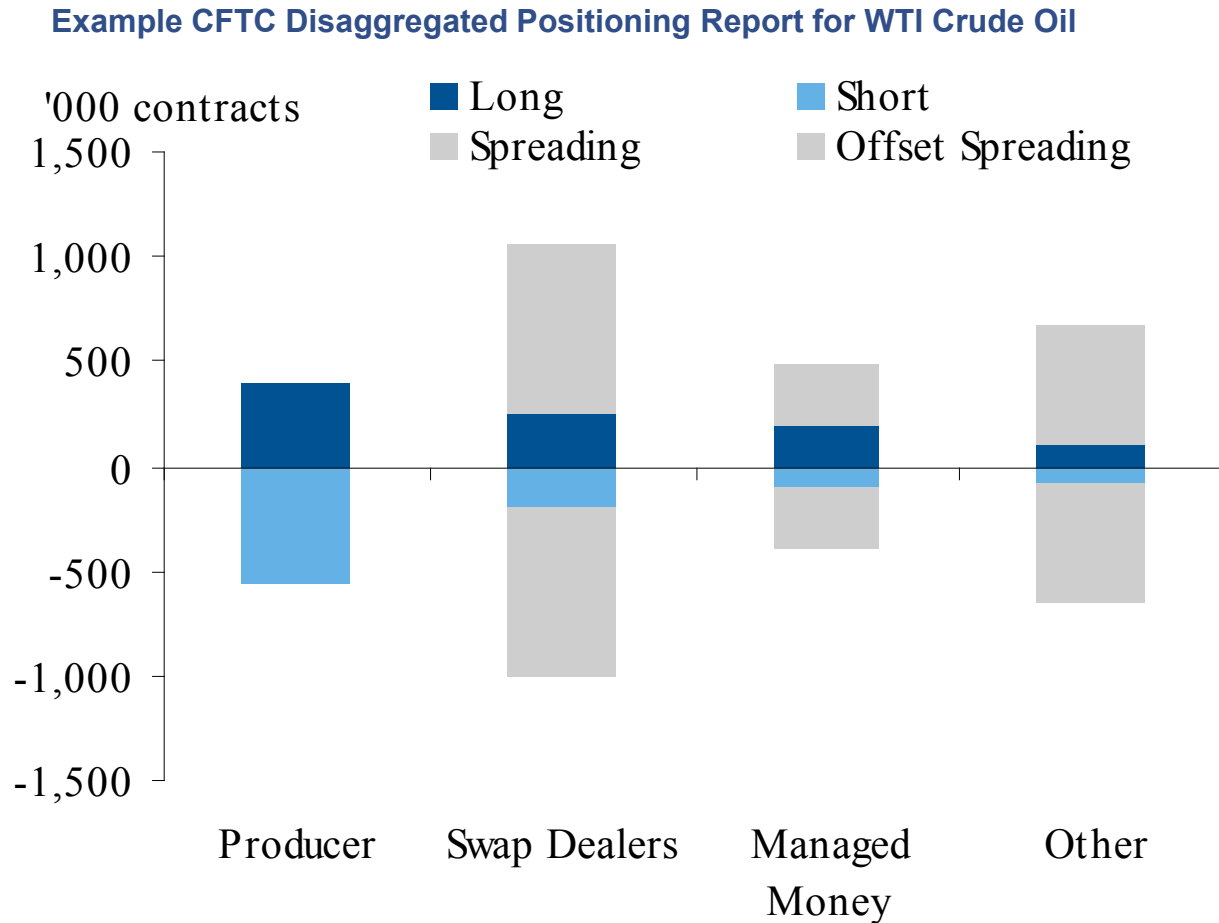
Daily Trading Volume in Paper Oil vs. Physical Oil Flows



Source: Bloomberg, EIA

CFTC Transparency Initiatives

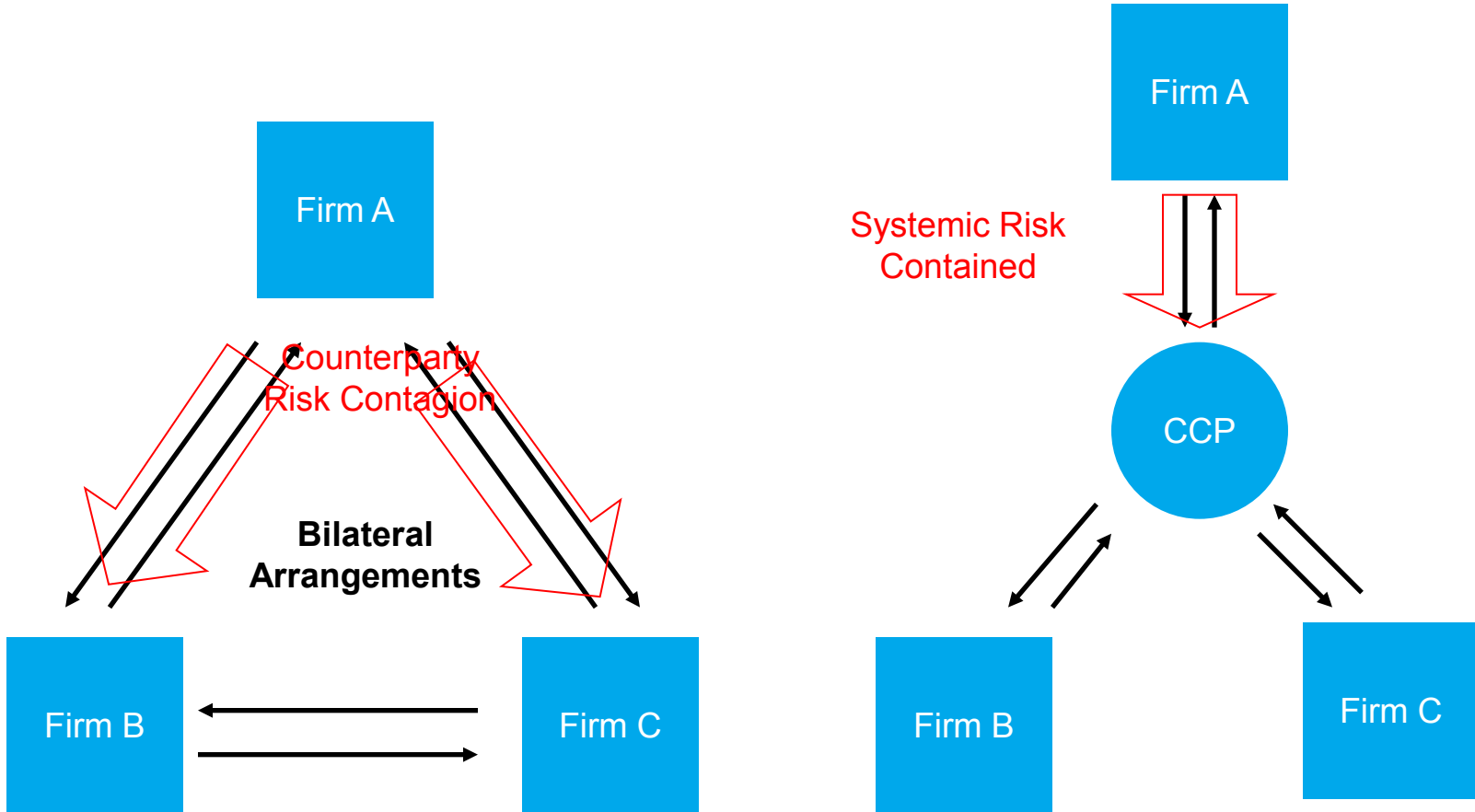
New Disaggregated Reports by US CFTC provide more transparency but large spreading positions still obscure full picture



Source: CFTC

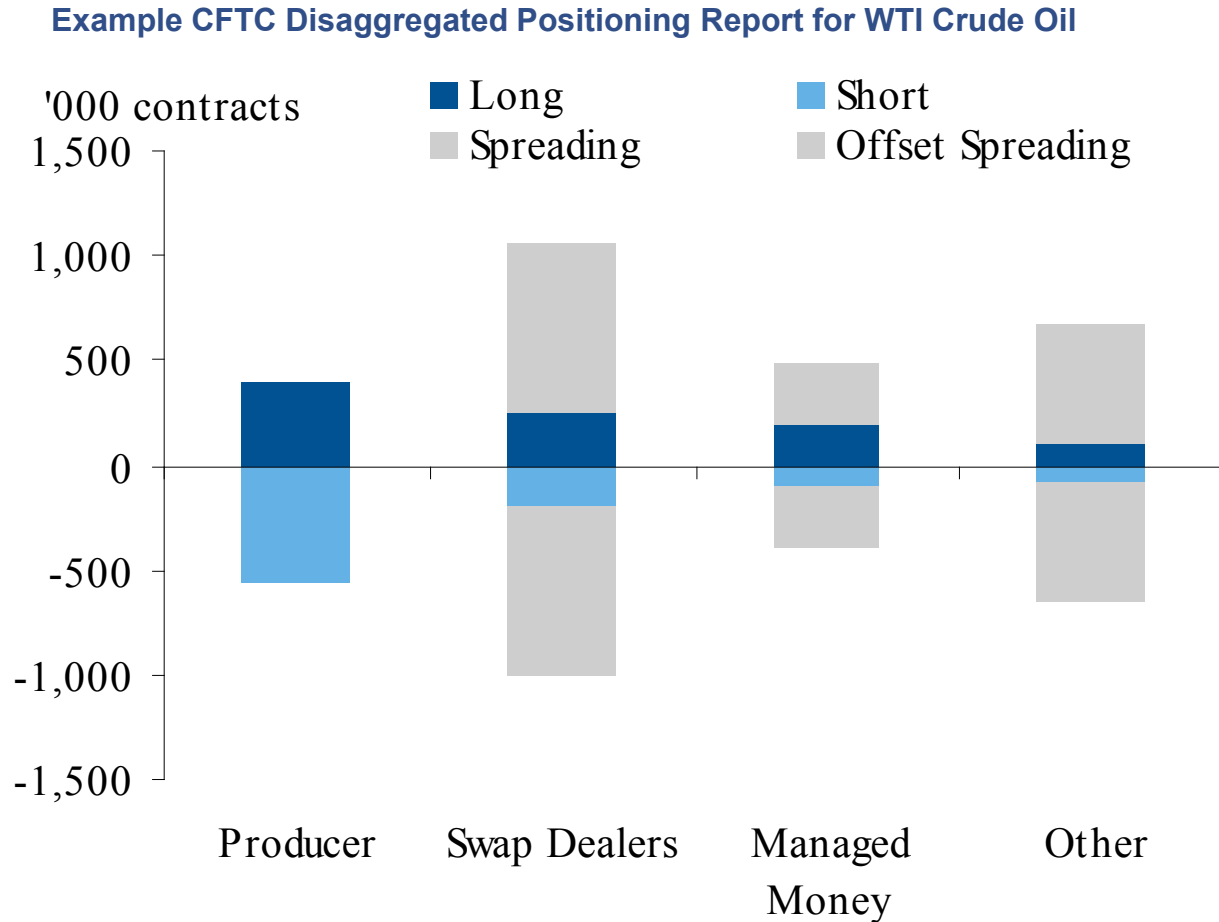
CFTC Centralized Clearing Initiatives

CFTC initiative toward mandated centralized clearing of standardized swaps show great promise in reducing systemic contagion



CFTC Transparency Initiatives

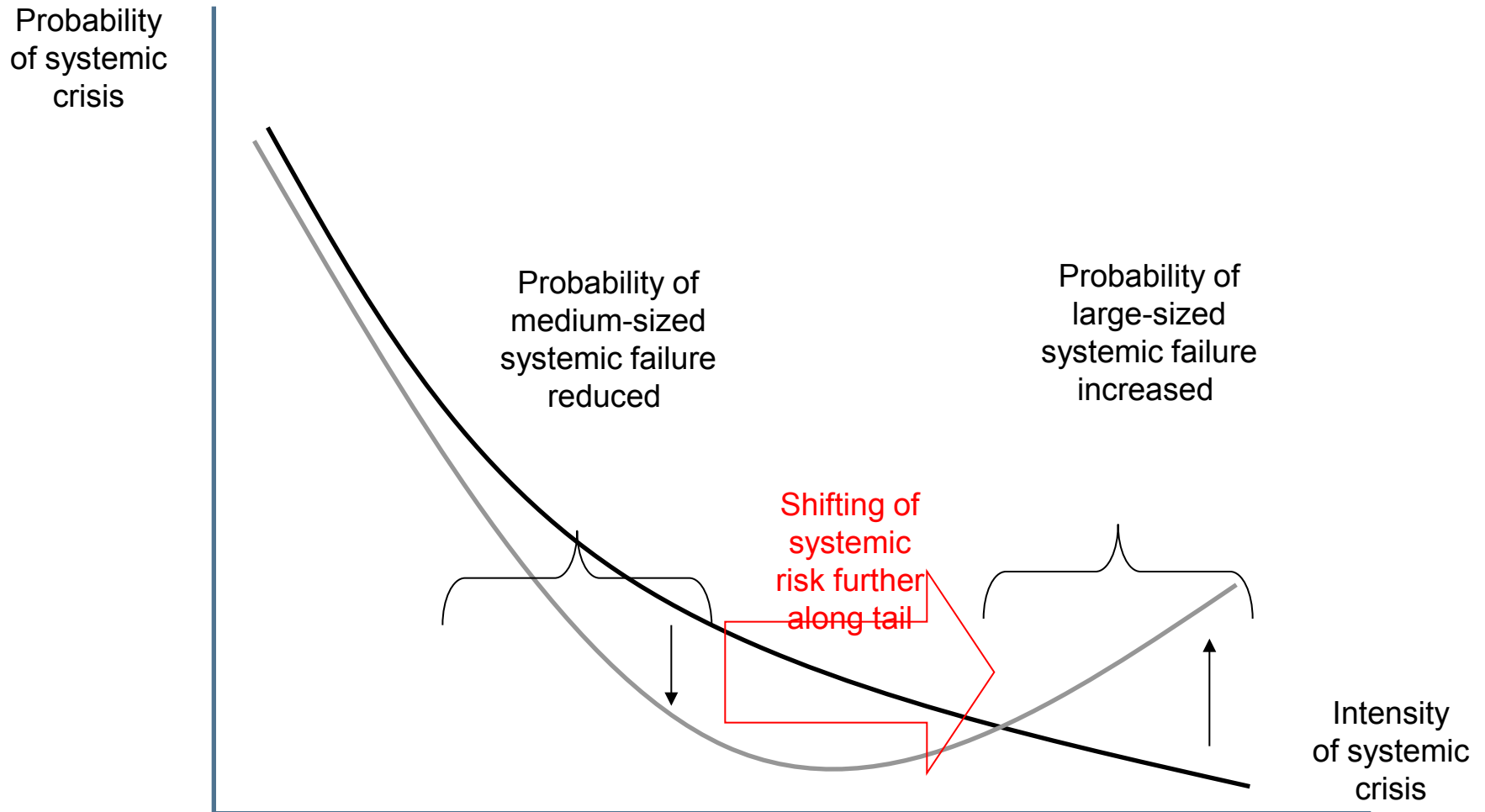
New Disaggregated Reports by US CFTC provide more transparency but large spreading positions still obscure full picture



Source: CFTC

CCPs and Systemic Risk

However, centralized clearing is not a complete free lunch. Unless CCPs are robust, they themselves can become sources of systemic risk!



Appendix: Regressions of Oil on Dollar Returns

Regression of oil on dollar returns at daily frequency

Dependent Variable: Oil Returns
 Sample (adjusted): 1/05/1987 12/31/2003
 Included observations: 4433 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.000	0.000	0.442	65.84%
Oil Returns Lag 1	0.000	0.018	-0.002	99.86%
Dollar Returns	0.099	0.111	0.895	37.09%
Dollar Returns Lag 1	0.096	0.061	1.570	11.66%
R-squared	0.10%			
Adjusted R-squared	0.03%			

Dependent Variable: Oil Returns
 Sample: 1/01/2004 8/31/2011
 Included observations: 2000

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.000	0.001	0.826	40.89%
Oil Returns Lag 1	-0.038	0.031	-1.217	22.36%
Dollar Returns	-1.385	0.150	-9.229	0.00%
Dollar Returns Lag 1	0.166	0.191	0.868	38.56%
R-squared	9.45%			
Adjusted R-squared	9.32%			

Regression of oil on dollar returns at monthly frequency

Dependent Variable: Oil Returns
 Sample (adjusted): 1987M02 2003M12
 Included observations: 203 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.002	0.006	0.400	68.99%
Oil Returns Lag 1	0.084	0.086	0.973	33.19%
Dollar Returns	-0.318	0.239	-1.329	18.55%
Dollar Returns Lag 1	0.063	0.224	0.280	77.97%
R-squared	1.58%			
Adjusted R-squared	0.10%			

Dependent Variable: Oil Returns
 Sample: 2004M01 2011M08
 Included observations: 92

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.006	0.011	0.556	57.99%
Oil Returns Lag 1	0.180	0.176	1.020	31.05%
Dollar Returns	-1.391	0.511	-2.722	0.78%
Dollar Returns Lag 1	-0.047	0.369	-0.128	89.83%
R-squared	19.60%			
Adjusted R-squared	16.86%			

Source: IMF